Project A: Particle System

Alexis Martineau

ahm693

Goals:

With this project, this I hoped to construct a scalable and versatile particle system to create various particle effects. I decided not to focus too much on the shader writing aspect, with very simple ball and triangle point renders and a wire-frame ground plane.

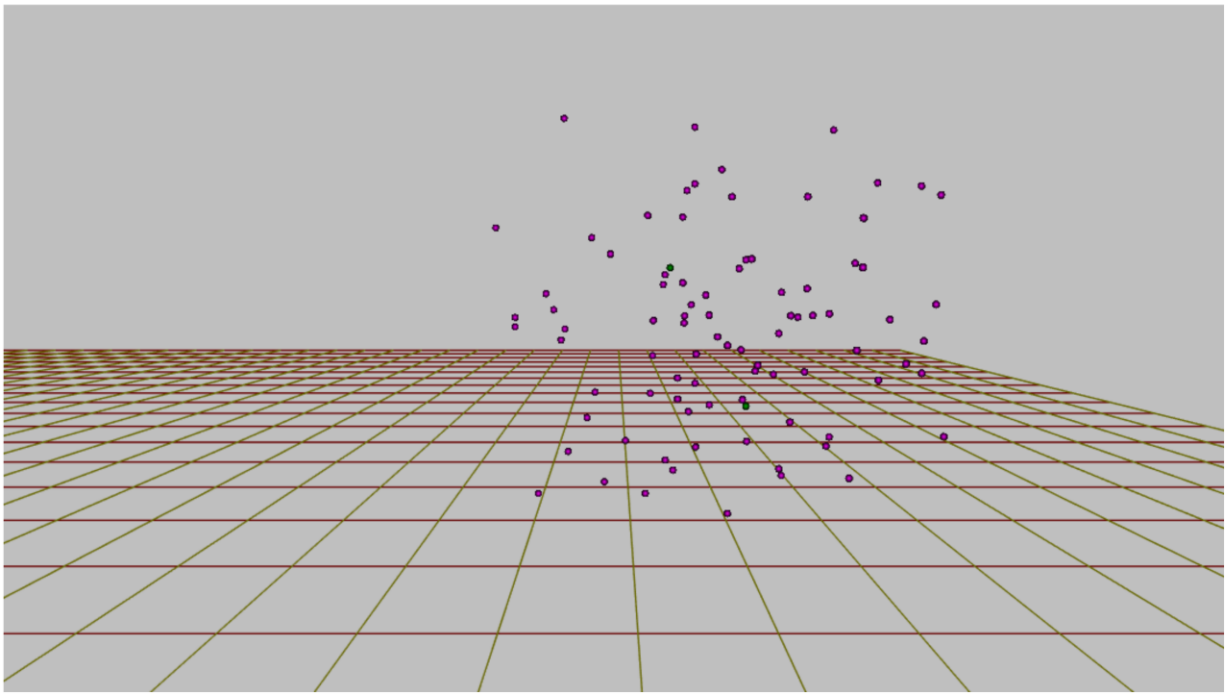
User Guide:

The specifics of the controls can be found on the Html page of the project. One thing to note is that the controls affect the particle system in the section of the grid the camera is in. The selected system will be named under the canvas.

Code Guide:

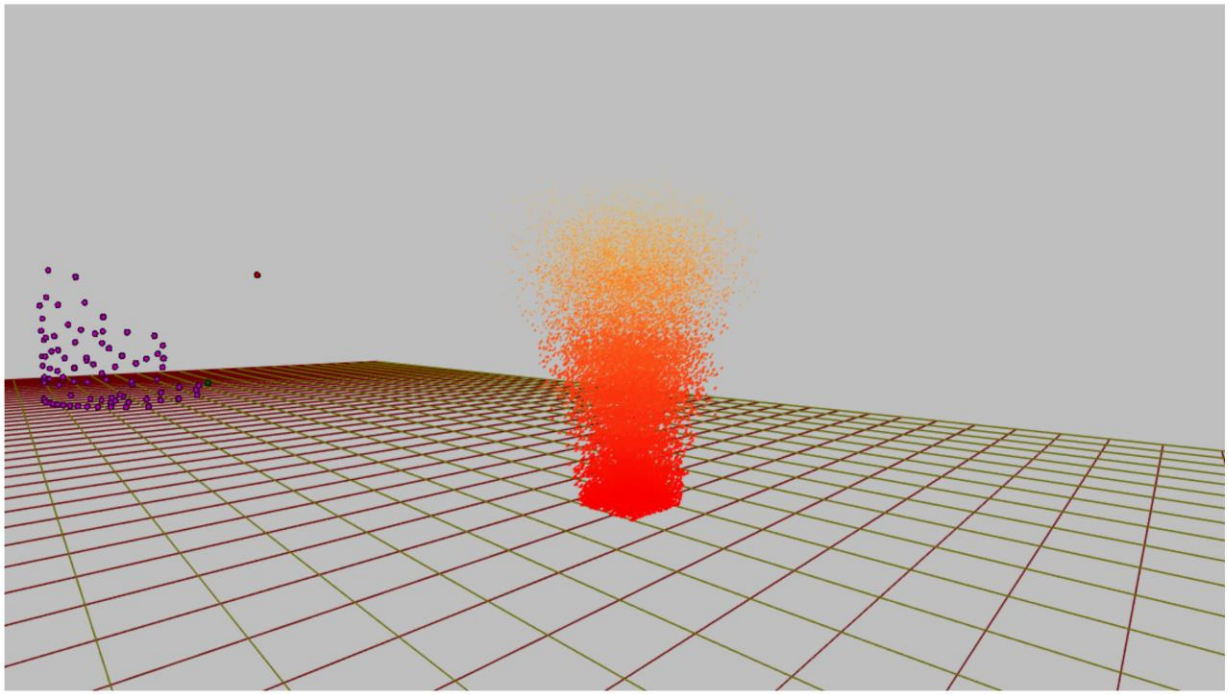
The main rendering script is called Main.js. Most of the code for the particle system is in PartSys01a.js. Here we sill find the specifics for solvers, forcers and constraints. Each individual particle system type has their own initialization file named after them. Furthermore, the initialization for CForcers and CLimiters are in separate files.

Results:



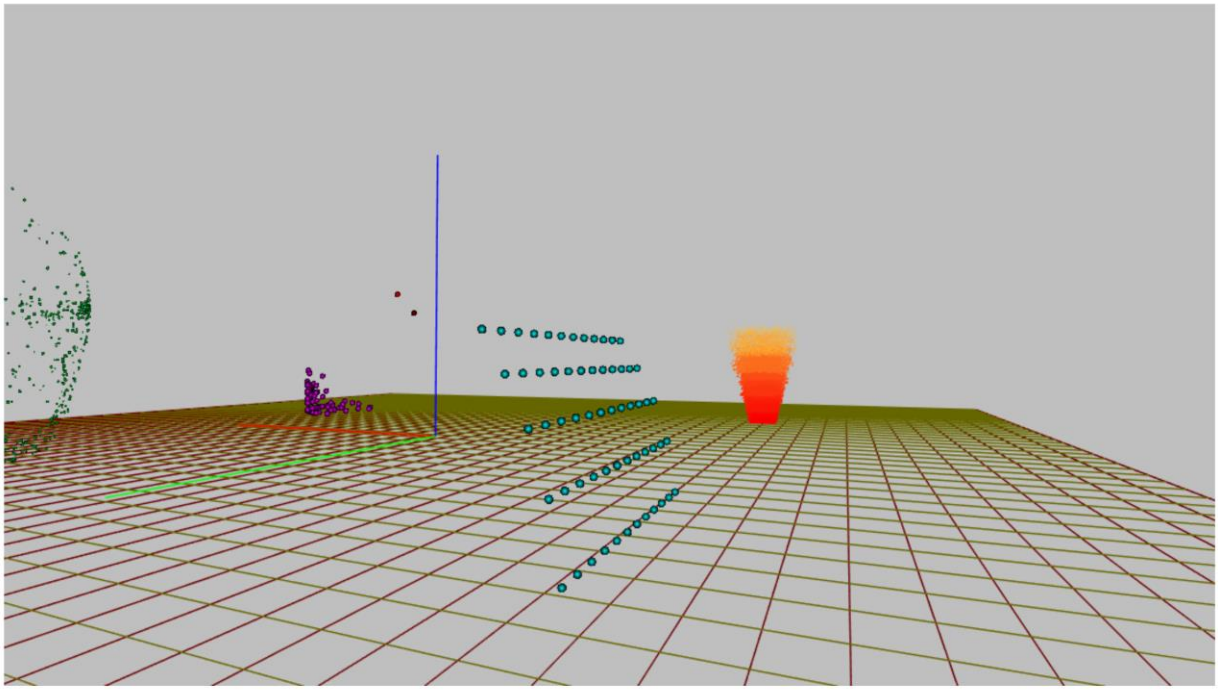
Boids flocking, 90 particles

This boids particle system simulates 90 flock members with attractors (in green) and repulsors (in red) appearing periodically.



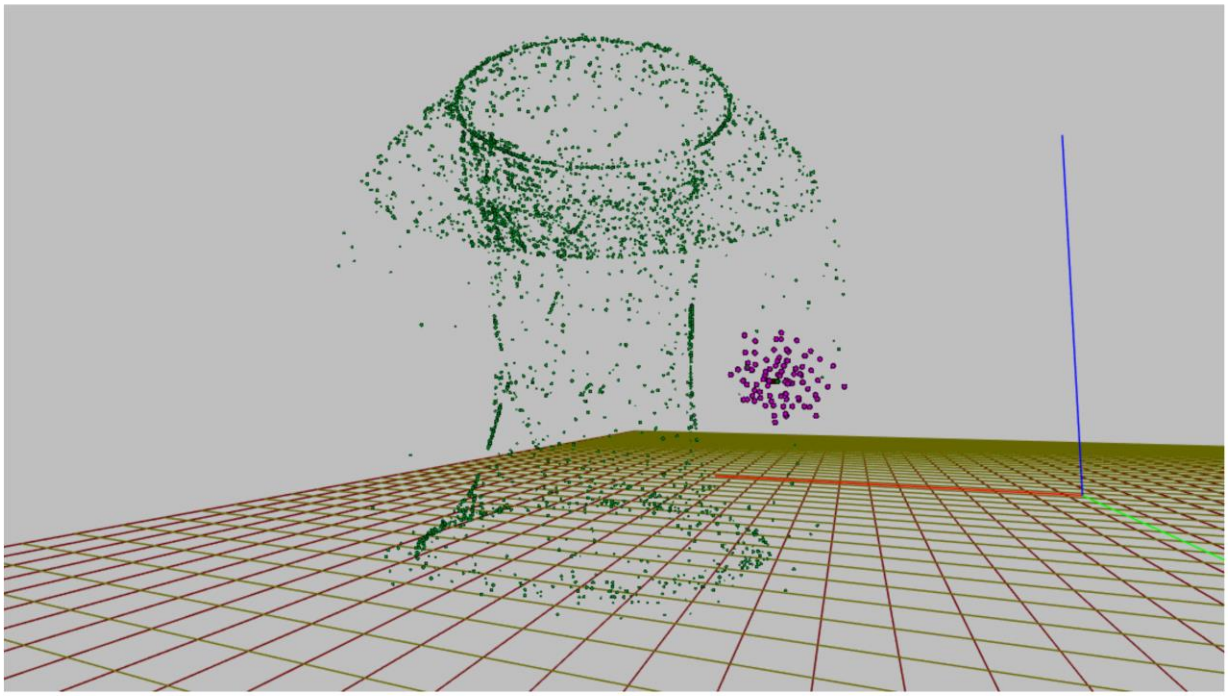
Reeves Fire, 20000 particles

This Reeves Fire effect is made with recycled particles which all follow the same life cycle. Notice the triangular shape of the particles and how the become smaller and change color with age.



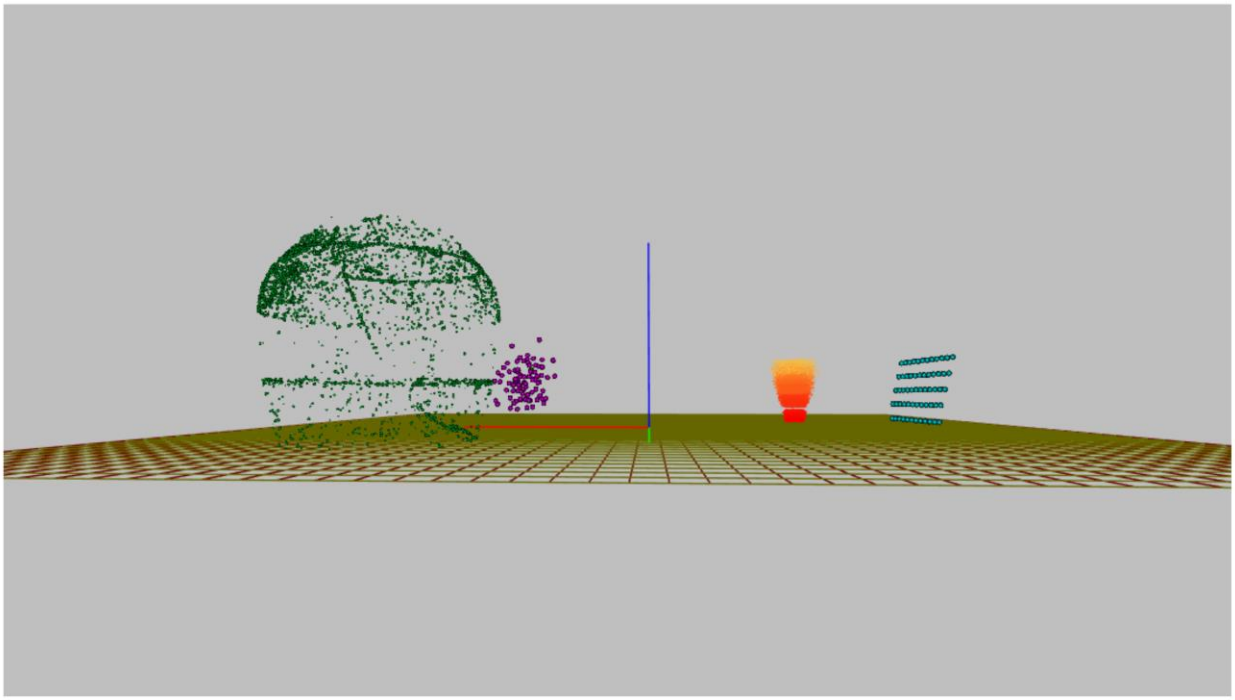
Cloth, 60 particles

This cloth is made of interconnected springs. These have to be solved with the Velocity Verlet solver in order to be stable, feel free to change the solver to see for yourself. The wind effect is programmed as a gaussian function of time which gives a natural look to the progression.



Tornado force field, 5000 particles

This tornado is created by applying a position dependent field to a large number of particles. Notice the shape of the envelope which results from the field rather than the x-y constraints (press t to see the shape of the enclosing volume).



All of these systems run simultaneously at an interactive frame rate. All of them use the same basic components even they create drastically varied effects.

"Optional" Credits:

3 Solvers: Explicit Midpoint, Explicit Euler, Velocity Verlet (only on cloth).

3 Spatial Constraints: Boxes, Cylinders, Anchors

1 'Exotic Force' Maker: Gaussian Applied Wind (cloth)

1 'Exotic Force' Maker: Triangle Embers (fire)